



The U.S. Global Change Research Program (USGCRP) National Climate Assessment (NCA)

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Scientific Assessments

Increasing complexity, # of authors & papers, and strength of the review process

Journal article

- One study that *presents* results of one analysis
- Typically fewer than 10-12 authors
- Peer reviewed through journal publication process

Review article

- Surveys and *summarizes* previously published studies about a given topic (i.e. literature review), rather than reporting new facts or analysis
- Peer reviewed through journal process

Scientific Assessment

- Reports that *synthesize* and weigh the published scientific literature across a broader range of topics to determine key findings, describe uncertainties, and identify progress in the state of scientific understanding
- Developed by extensive research community, undergoes multiple rounds of robust peer review and transparent government and public input processes
- Conducted by agencies or organizations (e.g. NAS), national governments (e.g. NCA), or international organizations (e.g. IPCC)
- Provides authoritative and well-vetted information
- Serves as primary citation for Federal agencies, state, local, business, professional, educational, and public audiences

Additional general assessment background in Appendix.



U.S. Global Change Research Program

- The U.S. Global Change Research Program (USGCRP) was mandated by Congress in the Global Change Research Act of 1990 (P.L. 101-606), “to assist the Nation and the world to **understand, assess, predict** and **respond** to human-induced and natural process of global change”
- Through USGCRP, agencies work to:
 - Coordinate global change research across the government
 - Use research results and products to provide information regarding risk management in a changing climate
 - Inform and deliver products mandated by the GCRA, including the quadrennial National Climate Assessment (NCA)
- Overseen by Principals representing the 13 member agencies of the CENRS Subcommittee on Global Change Research (SGCR)





National Climate Assessment Mandate

From the Global Change Research Act of 1990:

Not less frequently than every 4 years ... [the Program] shall prepare and submit to the President and Congress an assessment which:

- Integrates, evaluates, and interprets the findings [of the Program] ... and discusses the scientific uncertainties associated with such findings
- Analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity
- Analyzes current trends in global change, both human- induced and natural, and projects major trends for the subsequent 25 to 100 years.

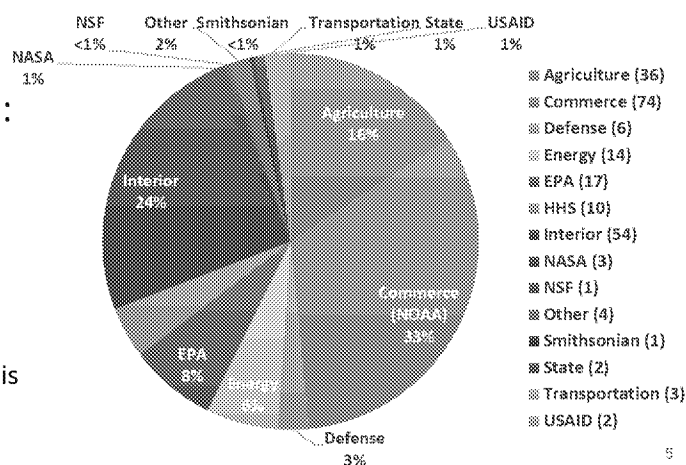


EPA's role in Scientific Assessments

- NCA4 is not an EPA report – it is a report of the USGCRP
- 16 EPA people are NCA4 authors on 9 chapters and a few additional contributors (more presence on Air Quality chapter)

- EPA has been engaged in past National Climate Assessments as well as other assessment reports:

- 2016 Climate and Health Assessment
- IPCC assessments and Special Reports (e.g. SREX, 1.5°C)
- National Academy of National Research Council Assessments
- Lead Agency for several Synthesis and Assessment Products, 2007





Fourth NCA

- Produced in two volumes with NOAA serving as Administrative Lead Agency
 - Vol. I: *Climate Science Special Report* (CSSR summarized in Ch. 2 of Vol. II)
 - “Upstream” assessment of the physical science of climate change in the U.S.
 - Lays the scientific foundation for Volume II
 - Released in final form Nov 3, 2017 (after 6 rounds of review)
 - Vol. II: *Climate Change Impacts, Risks, and Adaptation in the U.S.*
 - “Downstream” societal impacts assessment of climate change in the U.S.
 - Released in **draft** form Nov 3, 2017 for public comment and National Academies review (both now completed). Final report expected to be released December 2018.
- NCA4 volume 2
 - A technical, scientific assessment of climate impacts, risks, and adaptation. This volume analyzes the effects of the global change described in CSSR on sectors and regions of the United States
 - Policy relevant, but not policy prescriptive
 - Assess a range of potential impacts, helping decision makers better identify risks that could be avoided or reduced
 - Places a strong emphasis on regional information and uses case studies to provide additional context and showcase community success stories

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NCA4 Vol. II Report Findings

1. **Communities.** Climate change creates new risks and exacerbates existing vulnerabilities in communities across the United States, jeopardizing economic growth, human health and safety, and quality of life.
2. **Economy.** Without aggressive global mitigation and regional adaptation efforts, climate change will increasingly cause losses to American infrastructure and property and impede our economic growth over this century.



Figure 1.13: Razor Clamming on the Washington Coast. Razor clamming draws crowds on the coast of Washington. This popular recreation activity is expected to decline due to ocean acidification, harmful algal blooms, warmer temperatures, and habitat degradation. *Figure 24.7 from Ch. 24: Northwest.* Source: NOAA Northwest Fisheries Science Center.

NCA4 Vol. II Report Findings

3. **Interconnected Impacts.** Climate change affects the natural, built, and social systems we rely on individually and through their connections to one another. These interconnected systems are increasingly vulnerable to cascading impacts that are often difficult to predict, threatening essential services within and beyond the Nation's borders.
4. **Actions to Reduce Risks.** Communities, governments, and businesses are working to reduce risks and associated costs of climate change by taking action to lower greenhouse gas emissions and implement adaptation strategies. Mitigation and adaptation efforts do not yet approach the scale needed to avoid substantial damages to the economy, environment, and human health over the coming decades.
5. **Water.** The quality and quantity of water available for use by humans and ecosystems across the country are being affected by climate change, increasing risks and costs to agriculture, energy production, industry, recreation, people, and the environment.

NCA4 Vol. II Report Findings

6. **Health.** Impacts from climate change on extreme weather, air quality, and the transmission of disease through insects and pests, food, and water increasingly threaten the health and well-being of the American people, particularly populations that are already vulnerable.
7. **Indigenous Peoples.** Climate change increasingly threatens Indigenous communities' livelihoods, economies, health, and cultural identities by disrupting interconnected social, physical, and ecological systems.



Figure 1.18: Adaptation Measures in Kivalina, Alaska A rock revetment was installed in the Alaska Native Village of Kivalina in 2010 to reduce increasing risks from erosion. A new rock revetment wall has a projected lifespan of 15 to 20 years. *Figure 15.3, Ch. 15: Tribal & Indigenous. Credit: ShoreZone.*

NCA4 Vol. II Report Findings

8. **Ecosystems and Ecosystem Services.** Ecosystems and the benefits they provide to society are being altered by climate change, and these impacts are projected to continue. Without aggressive reductions in global greenhouse gas emissions, transformative impacts on some ecosystems will occur. Some ecosystems, such as coral reef and sea ice ecosystems, are already experiencing transformational changes.
9. **Agriculture.** Rising temperatures, extreme heat, drought, wildfire on rangelands, and heavy downpours are expected to increasingly disrupt agriculture in the United States, reducing crop yields and quality, increasing crop and livestock exposure to pests, and threatening rural livelihoods.

NCA4 Vol. II Report Findings

10. Infrastructure. Our Nation's aging infrastructure is further stressed by increases in heavy precipitation events, coastal flooding, heat, and other extreme events as well as changes to average precipitation and temperature. Without adaptation, climate change will continue to degrade infrastructure performance over the rest of the century, with the potential for cascading impacts that threaten our economy, national security, essential services, and health and well-being.

11. Oceans and Coasts. Coastal communities and the ecosystems that support them are increasingly threatened by the impacts of climate change. Without significant reductions in global greenhouse gas emissions and regional adaptation measures, many coastal regions will be transformed by the latter part of this century, with impacts affecting other regions and sectors.

12. Tourism and Recreation. Outdoor recreation, tourist economies, and quality of life are reliant on benefits provided by our natural environment that will be degraded by the impacts of climate change in many ways.

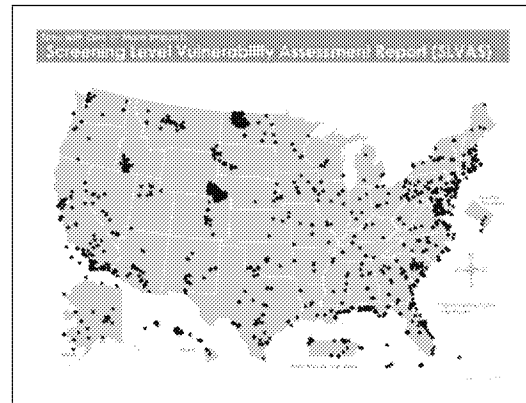


Figure 1.9: Weather and Climate-Related Impacts on U.S. Military Assets To identify Department of Defense installations with vulnerabilities to climate-related impacts, a preliminary Screening Level Vulnerability Assessment Survey (SLVAS) of DoD sites worldwide was conducted in 2015. Source: Department of Defense.



Review and Clearance, Next Steps

2017

- **Jan.** SGCR reviews Zero Order Draft (annotated outlines)
- **July-Aug.** NOAA Technical Support Unit reviews First Order Draft
- **Aug.** SGCR reviews Second Order Draft
- **Nov-Jan 2018.** Public Review and Comment on Third Order Draft
- **Nov-Mar 2018.** National Academies of Sciences, Engineering, and Medicine review of Third Order Draft

2018

- **Apr-May.** SGCR reviews Fourth Order Draft
- **April 27 – May 18.** Interagency Review
- **June 8.** Federal Clearance of Fifth Order Draft (clearance by EPA SGCR Principal)
- **August.** Federal Steering Committee ensures final agency comments are addressed
- **Sept-Dec.** Final layout and website production
- **Dec.** Web release of NCA4



Appendix

- Additional NCA4 material
 - Table of Contents
 - Public Engagement
- Assessment Processes
 - Process for Developing Assessments
 - Uncertainty and Transparency in Assessments
 - Assessment Review Processes



NCA Vol II Content

I. Overview

II. Our Changing Climate

III. National Topics

- Water
- Energy
- Land Cover and Land Use Change
- Forests
- Ecosystems, Ecosystem Services, and Biodiversity
- Coastal Effects
- Oceans and Marine Resources
- Agriculture and Rural Communities
- Built Environment, Urban Systems, and Cities
- Transportation
- Air Quality **NEW!**

- Human Health
- Tribal and Indigenous Communities
- Climate Effects on U.S. International Interests
- Sectoral Interdependencies, Multiple Stressors, and Complex Systems **NEW!**

IV. Regional Chapters

- Northeast
- Southeast
- US Caribbean **NEW!**
- Midwest
- Northern Great Plains
- Southern Great Plains
- Northwest
- Southwest
- Alaska
- Hawai'i and U.S. Affiliated

Pacific Islands

V. Response

- Near-term Adaptation Needs and Increased Resiliency
- Reducing Risks through Emissions Mitigation

VI. Appendices

- Process
- Information Quality Act
- Data Tools and Scenarios
- International **NEW!**
- Frequently Asked Questions

} Expanded



NCA4 Public Engagement

- Public feedback on the draft prospectus helped shape overall content and direction of NCA4
- A call for author nominations helped ensure a range of expertise was included in the writing process
- Technical inputs were solicited through a public call, giving individuals an opportunity to include relevant literature (peer reviewed and grey)
- A series of Regional Engagement Workshops and sector-specific webinars reached more than 1000 stakeholders, ensuring more relevant, useable chapter content
- A call for Review Editors provided an important layer of external, independent validation that authors responded to external comments
- Nov 2017 – Jan 2018: Public review and comment on the Third Order Draft of NCA4 Vol. II



Process for Developing Assessments

- Selecting authors
 - Call for nominations (e.g. to governments, through FRN, across organizations)
 - Selection criteria applied (often by independent contractor or committee) includes any conflict-of-interest, level of expertise, publications, experience, chapter needs, etc.
 - Seek diversity of scientific views, backgrounds, geographies, gender, career level
 - Hierarchy of Convening Leads, Leads, Contributing or Technical Authors, and Contributors
 - Authors volunteer their time and expertise
- Literature review and drafting chapters
 - Authors are provided guidance on literature reviews, writing, figures, etc.
 - Authors identify and collect literature. Literature can also be submitted through public calls for information or in any comment/review process.
 - Primary sources must be peer-reviewed and publicly accessible. Any “gray” literature cited must be documented and the reason for using it validated.
 - Studies are screened for integrity, rigor, utility, and clarity



Uncertainty and transparency in national assessment key findings

Uncertainty

- Authors assign both confidence and likelihood language to each finding
- Confidence
 - Based on the type, amount, quality, skill, strength, and consistency of evidence; and the degree of agreement within the body of literature.
- Likelihood
 - The probability of an effect or impact occurring, based on measures of uncertainty expressed probabilistically

Traceable Account

- Every finding in an assessment has a traceable account associated with it to describe and document the process for its development
- Traceable accounts describe the evidence base (state of the literature, consensus, etc.), outline major uncertainties, and explain why the confidences and likelihoods were assigned



Assessment Review Processes

- Assessments undergo extensive review process (e.g. NCA4 has 6 rounds). Typically:
 - ✓ Public or internal review on the scope or outline of the report before drafting
 - ✓ The papers cited in the report are independently peer reviewed
 - ✓ First review by experts (e.g. the Subcommittee on Global Change Research)
 - ✓ Public comment review
 - ✓ Independent external peer review (e.g. by the National Academies of Science)
 - ✓ Sometimes the peer review is peer reviewed (e.g. NAS peer reviews)
 - ✓ Review editors review authors changes and responses to peer and public review
 - ✓ Second review by experts and governments
 - ✓ Final review and clearance by agencies/ governments
 - ✓ Final clearance/ approval/ acceptance
- Public engagement through calls for information, nomination of authors, comments on the scope/outline, comments on the draft report, outreach and communication

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